

(FPE32-8A)

Amendment to the claims under PCT Article 19(1) (Rule 46)

(PCT/JP03/02511, 04 March 2003; PCT/E32-2)

WHAT IS CLAIMED IS:

1. (Amended) A semiconductor device comprising:  
a substrate;  
a one conductive type semiconductor layer provided on the substrate and having a sectorial or trapezoidal shape of which an opening angle is 20 degrees or more; and  
a transistor provided on the one conductive type semiconductor layer such that electric current flows along a grain boundary.
2. (Amended) A thin film transistor comprising:  
a one conductive type semiconductor layer;  
a source region and a drain region which are separately provided in the semiconductor layer such that electric current flows along a grain boundary; and  
a gate electrode provided above or below the semiconductor layer with an insulating film interposed therebetween,  
wherein the width of the junction face between the source region and a channel region that is provided between the source region and the drain region, is different from the width of the junction face between the channel region and the drain region.
3. A thin film transistor as claimed in claim 2, wherein said semiconductor layer has an approximately trapezoid or approximately sector plane shape.
4. A thin film transistor as claimed in claim 3, wherein said trapezoid or sector plane shape has an opening angle of 20 degrees or more.
5. A thin film transistor as claimed in any one of claims 2 through 4, wherein said semiconductor layer includes one or more grain boundaries, which extend in the direction from the source region to the drain region or from the drain region to the source region of the semiconductor layer.

6. A thin film transistor as claimed in claim 3 or 4, wherein said semiconductor layer includes two or more grain boundaries, each of which extends in the direction from the source region to the drain region or from the drain region to the source region of the semiconductor layer and also, each of which extends in the in-plane direction of the semiconductor layer in correspondence with the opening angle of the trapezoid or sector.

7. A thin film transistor as claimed in claim 2, wherein said semiconductor layer includes two or more grain boundaries, each of which extends in the direction from the source region to the drain region or from the drain region to the source region of the semiconductor layer, and also, two grain boundaries adjacent to each other extend in the in-plane direction of the semiconductor layer with an opening angle.

8. A thin film transistor as claimed in claim 2, wherein said semiconductor layer includes two or more crystal grain boundaries, each of which extends in the direction from the source region to the drain region or from the drain region to the source region of the semiconductor layer, and also, two crystal grain boundaries adjacent to each other are in parallel with the in-plane direction of the semiconductor layer.

9. A thin film transistor as claimed in any one of claims 5 through 8, wherein the difference between two angles is 20 degrees or more, one of said two angles being an angle made by one imaginary line connecting the middle position of the width of the junction face between the channel region and the source region with the middle position of the width of the junction face between the channel region and the drain region and the other imaginary line extending in the extending direction of the grain boundary, and the other angle being an opening angle defined by the width of the junction face between the channel region and the source region and the width of the junction face between the channel region and the drain region.

10. A circuit apparatus comprising:  
a substrate;

a thin film transistor as recited in any one of claims 2 through 9 and formed directly or indirectly on the substrate, the thin film transistor being of N-type; and

a thin film transistor as recited in any one of claims 2 through 9 and formed directly or indirectly on the substrate, the thin film transistor being of P-type,

wherein the thin film transistor of N-type and the thin film transistor of P-type are arranged to take point-symmetrical positions, respectively.

11. A liquid crystal display comprising a thin film transistor as recited in any one of claims 2 through 9.

12. A liquid crystal display comprising a circuit apparatus as recited in claim 10.

13. A circuit apparatus comprising;

a substrate;

a semiconductor film having a lot of grain boundaries and provided on the substrate; and

a thin film transistor which is formed in the semiconductor film, and in which electric current flows in parallel with the direction of one of the grain boundaries.

14. A circuit apparatus comprising;

a substrate;

a semiconductor film provided on the substrate and having a lot of grain boundaries; and

a plurality of thin film transistors which are formed in the same plane direction of the semiconductor film, in which electric current flows in parallel with the direction of each of the grain boundaries.